

**Abstract of the Disclosure**

A method for depositing solder bumps on a circuit substrate. The method comprises forming a dielectric layer on the circuit substrate which includes a plurality of conductive regions. The dielectric layer is patterned and opened to expose the conductive regions. A solder bump is disposed on each of the conductive regions, and a barrier layer is disposed on each of the solder bumps. Subsequently, the method includes forming a second solder bump on each of the first solder bumps. In an alternative method, solder bumps are initially disposed on each of the conductive regions and are then covered with a dielectric material. Subsequently, the dielectric material and a portion of the solder bumps are removed, and a barrier layer is disposed on each of the remaining structures of the solder bumps. The second solder bump material may then be disposed on the barrier layer. The articles produced by the methods of the present invention include semiconductor substrates or wafers having stacked solder bumps.